FIFTH FIVE-YEAR REVIEW REPORT FOR BAYOU BONFOUCA SUPERFUND SITE SLIDELL, TAMMANY PARISH, LOUISIANA

July 2016

1993

2016

Prepared by

U.S. Environmental Protection Agency
Region 6
Dallas, Texas

FIFTH FIVE-YEAR REVIEW REPORT
BAYOU BONFOUCA SUPERFUND SITE
EPA ID#: LAD980745632
ST. TAMMANY PARISH, LOUISIANA

This memorandum documents the U.S. Environmental Protection Agency's performance, determinations and approval of the Bayou Bonfouca Superfund Site (Site) fifth Five-Year Review (FYR) under Section 121 (e) of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S. Code Section 9621 (c), as provided in the attached fifth FYR Report.

Summary of the Fifth Five-Year Review Report

The Site's remedy consists of long-term remedial actions, including groundwater extraction and treatment and capped waste remaining on site. A portion of the Site is currently being used by the City of Slidell Public Works Department and a portion is being used by the City of Slidell Parks and Recreation Department. There are no known exposures to contaminated sediment, soil or groundwater. Current institutional controls restrict altering elements of the remedy and disturbing or removing soil or groundwater on the site parcel. A groundwater optimization evaluation is currently planned to assess the effectiveness of the groundwater remedy and to identify a potential exit strategy for the Site.

Human Exposure Status: Under Control
Contaminated Groundwater Status: Under Control

Actions Needed

The following actions must be taken for the remedy to be protective over the long term: groundwater use restrictions need to be implemented above the southwestern groundwater plume and institutional controls for the landfill and groundwater should be considered in an appropriate decision document; subsidence monitoring well SM-5 needs to be replaced; the groundwater site plume map should be updated; the applicability of EPA's 2015 vapor intrusion guidance needs to be evaluated; and the groundwater remedy should be optimized to assess the effectiveness of the remedy and identify a potential exit strategy for the Site.

Determination

I have determined that the remedy for the Bayou Bonfouca Superfund site is short-term protective. This FYR Report specifies the actions that need to be taken for the remedy to be protective over the long term.

Pam Phillips, Acting
Carl E. Edlund, P.E.
Director, Superfund Division
U.S. Environmental Protection Agency Region 6

8/12/16
Date

CONCURRENCES

FIFTH FIVE-YEAR REVIEW REPORT
BAYOU BONFOUCA SUPERFUND SITE
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Casey Luckett Snyder
Casey Luckett Snyder
Remedial Project Manager

June 28, 2016
Date

Blake Atkins
Chief, LA OK NM Section

6/28/16
Date

John C. Meyer
Chief, Superfund Remedial Branch

6/30/16
Date

Marvin Benton
Attorney, Office of Regional Counsel

July 6, 2016
Date

Mark A. Peycke
Chief, Superfund Branch, Office of Regional Counsel

07/14/16
Date

Pamela Phillips
Deputy Director, Superfund Division

8/12/16
Date

ISSUES/RECOMMENDATIONS

FIFTH FIVE-YEAR REVIEW REPORT
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Issues and Recommendations Identified in the Five-Year Review Report:

OU(s): 1 & 2	Issue Category: Institutional Controls			
	Issue: Institutional controls are in place for the landfill and are necessary to ensure the protectiveness of the remedy. There are no current groundwater restrictions on private property above the southwestern groundwater plume. No institutional controls are included in site decision documents.			
	Recommendation: Initiate discussions with the City of Slidell regarding the need for a City ordinance to restrict construction of private water wells above the southwestern groundwater plume. Evaluate the need to include institutional controls for the landfill and the groundwater in an appropriate decision document.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State	EPA	12/31/2020

OU(s): 2	Issue Category: Remedy Performance			
	Issue: Subsidence monitoring well SM-5 located within the City of Slidell Public Works maintenance yard was inadvertently destroyed in 2015.			
	Recommendation: Replace subsidence monitoring well SM-5. Ensure wells are labeled acknowledging use as part of the Superfund site.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	Other	State	12/31/2016

OU(s): 2	Issue Category: Remedy Performance			
	Issue: The extent of the contaminated groundwater plume needs to be updated.			
	Recommendation: Determine data needs and necessary monitoring and update site plume maps.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	12/31/2018

OU(s): 2	Issue Category: Monitoring			
	Issue: Based on current knowledge of groundwater contamination, it is unclear if the vapor intrusion pathway needs to be further evaluated.			
	Recommendation: Using data collected and the updated plume maps, evaluate the need for a vapor intrusion evaluation per EPA's 2015 vapor intrusion guidance.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	7/31/2018

OU(s): 2	Issue Category: Remedy Performance			
	Issue: Groundwater cleanup goals have not been met and are unlikely to be met in an acceptable timeframe.			
	Recommendation: Perform an optimization of the Site. The optimization should assess the effectiveness of the groundwater remedy and identify a potential exit strategy for the Site.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	9/30/2018

Table of Contents

Tables

Figures

LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	Below Ground Surface
CDC	Center for Disease Control
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
HQ	Hazard Quotient
IC	Institutional Control
LDEQ	Louisiana Department of Environmental Quality
MCL	Maximum Contaminant Level
mg/kg	Milligrams per Kilogram
µg/L	Micrograms per Liter
NCP	National Contingency Plan
ng/L	Nanograms per Liter
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
ppb	Parts per Billion
ppm	Parts per Million
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
SEMS	Southern Environmental Management & Specialties
SVOC	Semi-Volatile Organic Compound
TCDD	Tetrachloro-dibenzo-p-dioxin
USACE	United States Army Corp of Engineers
UU/UE	Unlimited Use/Unrestricted Exposure

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fifth FYR for the Bayou Bonfouca Superfund site (the Site). The triggering action for this statutory review is the previous FYR. The FYR has been prepared due to the fact that hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of two operable units (OUs); this FYR addresses both OUs. OU1 addresses the contamination source (soils and bayou sediments). OU2 addresses contaminated groundwater.

The FYR was led by Casey Luckett Snyder, EPA Remedial Project Manager (RPM). Participants included John Halk of the Louisiana Department of Environmental Quality (LDEQ), Rick Tibbs of Southern Environmental Management & Specialties (SEMS), Inc., and Eric Marsh, Kirby Webster and Brice Robertson of Skeo Solutions. The review began on November 1, 2015.

Site Background

The 54-acre Site is located near the north shore of Lake Pontchartrain, in Slidell, Louisiana (Figure C-1, Appendix C). Beginning in the late 1800s, a commercial wood-treating (creosote) plant began operating on site. In addition to releases of creosote during the plant's operation, several large tanks ruptured during a fire in the early 1970s, causing creosote to flow across the Site and into the bayou, contaminating soil, bayou, creek and channel bottom sediments, surface water, and groundwater. Wood-treating operations ceased with the plant's disassembly between 1970 and 1972.

In April 1976, the U.S. Coast Guard began an evaluation of Bayou Bonfouca by collecting samples and investigating pollution reports by residents. Based on the contamination identified during investigations, EPA listed the Site on the Superfund program's National Priorities List (NPL) in September 1983.

For cleanup, EPA divided the Site into two OUs. EPA designated OU1 as the source control remedy and OU2 as the site groundwater remedy. The remedy for the source was excavation of polycyclic aromatic hydrocarbon (PAH)-contaminated soil and sediment, incineration of the materials in an on-site incinerator and disposal of the ash in an on-site Resource Conservation and Recovery Act (RCRA) landfill. The OU2 groundwater remedy includes a recovery and treatment system to extract and treat groundwater contaminated with dissolved phase PAHs and dense non-aqueous phase liquids (DNAPLs) associated with creosote contamination in the shallow artesian aquifer. The construction of the remedies has been fully implemented. The Site is currently managed as a long-term remedial action, including continued operation and maintenance (O&M) of the groundwater/DNAPL extraction system, the groundwater monitoring system and maintenance of the on-site landfill cap. Land uses surrounding the Site include commercial use to the east, a residential subdivision across the bayou to the southwest, woods on the western portion of the Site and several residences and businesses along the road to the north. Braselman Corporation deeded site property to the City of Slidell in 1997. The City of Slidell uses the eastern portion of the Site and former site buildings by the Public Works Department for vehicle storage and maintenance and the southeastern portion of the Site as part of a park (Heritage Park). A new marina project on Bayou Bonfouca, which will include floating docks, piers and new sidewalks, is in the design phase as part of Heritage Park.

Most of the Site is situated within the 100-year floodplain. The ground elevation is about 9 feet above mean sea level. Bayou Bonfouca is a navigable waterway that flows south from the Site about 7 miles to Lake Pontchartrain. The bayou is typical of surface waters in the Lake Pontchartrain area (i.e., tidal, typically low salinity waters with adjacent cypress swamps).

Groundwater in the immediate vicinity of the Site occurs in perched water table aquifers in surficial sediments (2 to 9 feet thick), recharged through infiltration from rainfall, and occurs permanently in four other zones: (1) the upper cohesive unit (to about 24 feet below ground surface, bgs); (2) the shallow artesian aquifer (from about 24 to 34 feet bgs on site and 15 to 25 feet bgs off site) - creosote product occurs almost exclusively in this unit; (3) the lower cohesive unit (8 to 28 bgs), which due to its low permeability functions as an aquitard (restricts vertical groundwater flow and contaminant transport); and (4) the deep artesian aquifer (more than 10 feet thick) - investigations indicate creosote contamination does not occur in this unit.

Materials range from lower permeability clay in the cohesive units to silt and medium-grained sands in the aquifers. Groundwater flow occurs through the shallow and deep artesian aquifers toward the bayou. The primary aquifer used for drinking water by the City of Slidell is the Pontchatoula aquifer, which occurs about 1,500 feet bgs.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Bayou Bonfouca		
EPA ID: LAD980745632		
Region: 6	**State:** LA	**City/County:** Slidell/St. Tammany Parish
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Casey Luckett Snyder, with additional support provided by Skeo Solutions		
Author affiliation: EPA Region 6		
Review period: 11/1/2015 – 6/1/2016		
Date of site inspection: 1/26/2016		
Type of review: Statutory		
Review number: 5		
Triggering action date: 8/12/2011		
Due date ***(five years after triggering action date)***: 8/12/2016		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Wood-treating operations occurred at the Site from the late 1800's to 1972. During this time, areas of the Site were contaminated through spills, runoff, possible discharges and ultimately through a fire in the early 1970s that ruptured several vessels. In April 1976, the U.S. Coast Guard began an evaluation of Bayou Bonfouca by collecting samples and investigating pollution reports by residents. EPA listed the Site on the Superfund program's National Priorities List (NPL) in September 1983.

The Site's 1986 remedial investigation identified the principal pollutants at the Site as PAH compounds associated with creosote. The contaminants of concern are benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene and chrysene. These constituents were identified in surface soils, on-site groundwater, off-site groundwater and bayou sediments. DNAPLs were also identified in groundwater beneath the southern portion of the Site, beneath the east drainage ditch and on the south side of the bayou under parts of a residential subdivision. The primary threats the Site posed to public health and safety were to people using this part of the bayou for recreation and exposure to PAHs in residential soil through normal exposure routes.

During the remedial investigation, a stretch of the bayou about a mile-and-a-half long was found to be biologically sterile due to creosote contamination in sediments and the water column. The contamination was so severe that it caused second-degree burns to divers, injured or killed aquatic animals and waterfowl, and posed a significant recreational hazard. The areas of highest contamination were found within the on-site creosote deposits and in surface soils near the creosote waste deposits. An estimated 4,000-foot stretch of the bayou was contaminated. The maximum depth of contaminated sediments was 17 feet. The estimated total volume of contaminated sediments was 150,000 cubic yards.

Response Actions

The Site's Records of Decision (RODs) – signed by EPA on August 15, 1985, and March 31, 1987 – identified remedial action objectives (RAOs) for OU1 (source material) and OU2 (groundwater):

- Minimize public exposure to creosote contamination existing on the surface of the Site.
- Reduce the potential for continued contaminant releases to the bayou from waste existing on the surface of the Site.
- Mitigate the potential for contaminant migration due to site flooding.
- Minimize continuing contamination in the surficial and upper artesian aquifers at the Site.
- Close the Site in a manner that will minimize contaminant migration resulting from surface runoff, minimize surface water ponding and minimize continued contamination from the creosote constituents.
- Reduce or eliminate the potential for ingestion of carcinogens in groundwater, surface soils and shellfish.
- Control the migration of PAH contamination in the shallow artesian aquifer and other aquifers.
- Reduce or eliminate the direct contact threat posed by bayou sediments and on-site surficial creosote waste deposits.

The final remedy identified in the 1985 and 1987 RODs, as amended by the 1990 Explanation of Significant Differences (ESD) and 1995 ROD Amendment, included:

- Incineration of creosote accumulations and contaminated sediments (bayou, creek and channel bottoms).
- Excavation of about 5 feet of sediment or a depth that will ensure that source of groundwater contamination by creosote is mitigated and the threat to aquatic biota minimized.
- RCRA cap over excavated contaminated sediments and soil.
- Bulkheads and turbidity curtains for bayou dredging.

- Backfilling dredged areas with clean materials.
- Groundwater pumping and treatment.
- Use of the existing Bayou Bonfouca incinerator for treatment of the Southern Shipbuilding Corporation Superfund site material. Resulting incinerator ash taken back to the Southern Shipbuilding Corporation site.

Table 1 shows site cleanup goals.

Table 1: Cleanup Goals

	Groundwater	Sediment	Soil
Total PAHs[a]	3.1 ng/L[b]	1,300 mg/kg[c]	100 mg/kg[d,e]

Notes:

a. Total PAHs included contaminants of concern (COCs) identified: benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene and chrysene.
b. From the 1987 ROD based on the 1987 Clean Water Act level or a health-based 10^{-4} or 10^{-6} level.
c. From the 1987 ROD based on ecological risk.
d. From the 1987 ROD based on human health risk.
e. The 1990 ESD re-evaluated ROD action levels, showing that the 1987 ROD action level of 100 ppm or mg/kg total PAHs for surface soils is equivalent to approximately 9 ppm carcinogenic PAHs.

ng/L = nanograms per liter
mg/kg = milligrams per kilogram
ppm = parts per million

Status of Implementation

OU1 – Source Control
EPA excavated and incinerated over 170,000 cubic yards of contaminated bayou sediments and creosote waste from November 1993 to July 1995. The resultant ash and on-site contaminated soils were placed on site in a RCRA-compliant Subtitle C landfill. The incinerator also incinerated wastes from the nearby Southern Shipbuilding Corporation Superfund site. The incinerator was removed from the Site in December 1996 after completing operations at the Southern Shipbuilding Corporation site. EPA issued a Preliminary Close-Out Report for OU1 in September 1997.

In 2006, LDEQ contractors sampled sediment to determine the impact, if any, Hurricane Katrina and Hurricane Rita storm surges may have had on the remedy's protectiveness. Sampling identified total PAH concentrations between 1.5 milligrams per kilogram (mg/kg) and 7 mg/kg in aquatic sediments and carcinogenic PAH concentrations in sediment between 0.09 mg/kg and 0.67 mg/kg. These values are well below the 1,300 mg/kg cleanup goal for sediments.

OU2 – Groundwater
EPA began operation of the long-term remedial action for DNAPL in groundwater in July 1991. The objectives of the groundwater cleanup program are to recover the free-phase creosote product by extracting impacted groundwater at an optimal rate without inducing sediment subsidence. The pump-and-treat system consists of several components:

- Extraction well arrays 1a, 2 and 3 (44 total extraction wells).
- Treatment building, air compressor (for plant and recovery pumps), and control system for recovery and treatment system.
- Collection system and piping and underground conduits, including a subsurface pipeline and leak detection system to service new extraction wells, and an underground pipeline extending across Bayou Bonfouca, complete with a leak detection sensor for fluid and air conveyance.
- Groundwater and free-phase treatment system (chelating agent, oil/water separator, solids removal filters, organic removal filter and associated tankage).

The original on-site groundwater remediation system included two networks of extraction wells – Array 1 (in the former plant operations area) and Array 2 (parallel to the former eastern drainage channel), installed in July 1991. A third array was installed in 2000 to address contamination in the off-site area beneath the residential neighborhood on the west side of the bayou. The three extraction arrays, are detailed below and shown in Figure C-2, Appendix C. All three well arrays pump from the shallow artesian aquifer.

During early recovery system operations, groundwater drawdown was monitored and controlled to prevent subsidence. A subsidence monitoring program was implemented to provide settlement data to evaluate and adjust future recovery system pumping rates, to prevent or control subsidence.

Array 1 and 1a
The Array 1 network was located within the RCRA landfill area where the source removal was required. Array 1 wells were removed during the soils remedial action in 1993.

Installation of the Array 1a network, which consists of 12 extraction wells around the southwestern perimeter of the landfill, was installed in 2000 to take the place of Array 1. Array 1a is located downgradient of the creosote plume, beneath the on-site landfill.

Array 2
The Array 2 network consists of 22 extraction wells and six subsidence wells. Array 2 is located along the eastern drainage channel.

Array 3
The Array 3 network consists of 10 extraction wells and five additional off-site subsidence monitoring wells (located off site on private property in the residential neighborhood on the west side of the bayou). Array 3 was installed to capture recoverable free-phase creosote and dissolved-phase contaminants in the off-site area beneath the residential neighborhood, on the west side of the bayou.

Well installation and groundwater treatment plant upgrades reached completion in 2000. The treatment plant currently discharges to Bayou Bonfouca. The separated DNAPL is stored on site and then disposed of off-site as a hazardous waste. The State of Louisiana assumed responsibility for operation and maintenance (O&M) at the Site in July 2001.

Institutional Control Review

Table 2 lists the existing institutional controls associated with the Site. Figure C-3 in Appendix C shows the location of the groundwater plume in 1998 and current institutional controls. Conveyance notices are recorded in the Conveyance Book, which is indexed to the Vendor (seller or owner) and Vendee (buyer) records at the Clerk of Court. Property record searches by Vendor or Vendee records will identify the conveyance notice.

Table 2: Summary of Institutional Controls (ICs)

Media, Engineered Controls and Areas that Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel	IC Objective	Title of IC Instrument Implemented and Date
Soil and Groundwater	Yes	No	EPA ID LAD98074 5632, Site ID No. 0600574	Use restriction for industrial/commercial use as well as a restriction on disturbing, destruction, interference with, or damaging or altering elements of the CERCLA remedy or disturbing or removing soil or groundwater without authorization from LDEQ, EPA or their successor agencies	Conveyance Notification April 22, 2008 Instrument #1680636
Groundwater	Yes	No	Private property on southwest side of bayou	Restrict use of contaminated groundwater	None

Systems Operations/Operation & Maintenance (O&M)

Current O&M activities are described in the Final Operation and Maintenance Plan, revised in September 2012. Groundwater sample collection occurs each quarter from four monitoring wells each quarter for analysis of semi-volatile organic compounds (SVOCs). The SVOC suite includes PAHs. The wells sampled can vary each month at the discretion of the plant operator. Southern Environmental Management & Specialties (SEMS, Inc.) submits monthly operations reports to LDEQ. The reports summarize O&M activities, including pumping and treating liquids from recovery wells in Arrays 1, 2 and 3; maintaining site grounds and equipment, including severe weather protection; operating the treatment plant; and collecting DNAPL. The 1987 ROD estimated annual O&M costs to be $173,748. Current O&M costs are estimated at $385,000 per year, similar to the amount reported in the last FYR, but about double the ROD estimate.

III. PROGRESS SINCE THE LAST REVIEW

"The remedy implemented at the Bayou Bonfouca site is considered protective of human health and the environment in the short term. The incinerated source control wastes are contained in the onsite RCRA Subtitle C compliant landfill. Access to the Site is restricted by a fence, and the groundwater treatment system operators are regularly onsite to ensure the system continues to operate and check site status. Affected groundwater and DNAPL are extracted and treated through operation of a groundwater treatment system. The treated groundwater is discharged to Bayou Bonfouca, and the recovered DNAPL is sent offsite for disposal. The facility is able to operate within its designed parameters, and effluent discharges meet the surface water discharge requirements established for the Site by the State of Louisiana.

Continued O&M will ensure that the selected remedy continues to be protective. Because the completed remedial action and O&M program for the Bayou Bonfouca site are considered protective for the short-term, the overall remedy for the Site is considered protective of human health and the environment for the short-term. The selected remedy will continue to be protective if the recommendations and follow-up actions identified in this five-year review are addressed."

Table 3: Status of Recommendations from the 2011 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Identification labels on some groundwater treatment system components are either illegible or missing.	Illegible or missing labels on groundwater treatment system should be replaced.	Completed	Stenciling on treatment system components has been done.	5/3/2016
The metal platform surrounding observation port for underground piping that crosses Bayou Bonfouca River is damaged due to saltwater corrosion from the river. Periodic inspections and maintenance are required at observation port and damaged platform is a health and safety risk for on-site O&M workers.	Repair or replace metal platform surrounding observation port at Bayou Bonfouca River.	Ongoing	The metal platform was replaced in 2008 but continues to corrode.	LDEQ continues to monitor corrosion of metal platform. Completion date not available at this time.
There are no procedures set forth in the draft O&M Plan to ensure regular inspections of the landfill cap and documentation of such inspections. At the time of the fourth FYR site inspection, the landfill cap appeared to be well maintained and in good condition. However, regular inspections and documentation of such inspections are appropriate to ensure it remains in good condition.	In addition to analytical data from groundwater monitoring well sampling included in monthly operational reports, quarterly cap inspection reports should be conducted and included.	Completed	Cap inspections will be included in monthly operational reports beginning in May 2016.	5/1/2016
Currently, there is no clear exit strategy for the	Without a predetermined exit point, operation	Ongoing	Region 6 is working to schedule a remedy optimization with EPA's	An exit strategy for the site has not

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Site. The ROD recognizes Clean Water Act levels of 3.1 ng/L for PAHs in drinking water. However, it states, "The technical feasibility of cleaning the groundwater to this level is unknown." There is no clear point at which the pump-and-treat system can be shut down.	may continue long beyond point of diminishing returns. To avoid this, a clear exit strategy should be developed that demonstrates protection of human and ecological health.		Office of Superfund Remediation and Technology Innovation to assess the effectiveness of the groundwater remedy and identify a potential exit strategy.	been developed to date. Conduct optimization review by September 2018.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available by press release in the *Northshore (Times-Picayune)* newspaper on November 25, 2015, stating that there was a FYR and inviting the public to submit any comments to EPA. The results of the review and the report will be made available at the Site's information repository, located at St. Tammany Parish Public Library – Slidell Branch, 555 Robert Boulevard, Slidell, Louisiana 70458.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The results of these interviews are summarized below. Interviewees included Casey Luckett Snyder (EPA RPM), John Halk (LDEQ), Rick Tibbs (SEMS, Inc.), Blaine Clancy (City of Slidell) and a nearby resident.

Overall impressions from the interviews were that the various parties are pleased with the work done at the Site. The pump-and-treat system is operating as intended; site grounds are well-maintained. EPA and LDEQ are coordinating with the City on the marina project to ensure remedy protection during construction and operation of the marina. LDEQ is working to coordinate an assessment of the corroded sheet piling in Bayou Bonfouca to determine corrective actions needed to mitigate risk associated with personal injury.

The nearby resident is concerned about the health and well-being of those who live near the Site or those who work for the City of Slidell close to the clay capped area. The resident worries about the toxic, burned material in the clay capped mound. There is concern for the integrity of the cap, particularly during Hurricane Katrina and other weather events that could cause erosion. During Hurricane Katrina, black helicopters were observed landing on the clay mound. The resident feels that EPA could inform people by announcing activities surrounding the Site in a publication. The resident would like the Site to continue to be reviewed and monitored to maintain the safety of those nearby. The EPA RPM has been in contact with the citizen to follow up on her concerns and to answer her questions about the site.

Data Review

Contaminated groundwater continues to be pumped from Arrays 1a, 2 and 3 through the treatment plant. Figure C-3 shows the groundwater plume as of 1998. Monthly sampling and analysis are performed for the following treatment system components:

- Inlet to oil/water separator.
- Inlet to the sand filter.
- Inlet to oleophilic filter.
- Inlet to carbon filters.
- 80 percent carbon bed depth.
- Effluent discharge.

Monthly sampling is performed to determine compliance with the system effluent discharge limitations (LDEQ limitations) and the need for liquid-phase carbon replacement. Effluent discharge is sampled quarterly for volatile organic compounds, SVOCs and metals (Table G-1). Between December 2010 and December 2015, 2,4-dimethylphenol exceeded effluent limitations three times (May 2013, June 2014 and September 2014). The December 2015 monitoring report recommends continued use of the existing carbon.

SVOC analysis occurs on a quarterly basis for four wells (MW-1, MW-2, SM-3 and SM-8, see Figure C-2) to ensure groundwater contamination remains contained (Table G-2, Appendix G). Between December 2010 and September 2015, detections of contaminants occurred as shown in Table 4. Data not reported in this table was below the detection limit. All detections were below current comparable standards except for bis(2-ethylhexyl)phthalate and naphthalene. Bis(2-ethylhexyl)phthalate was detected above current standards in MW-1 and MW-2 in September 2014. Naphthalene was detected in MW-1 and MW-2 above current standards during the reporting period with a maximum concentration of 6,820 µg/L observed in MW-1 in September 2013. Naphthalene was not detected above the detection limit of 10 µg/L in MW-1 during quarterly sampling events in 2014 and the first three sampling events of 2015, as reported in the December 2015 Monthly Report.

Table 4: Contaminant Detections Identified in Monitoring Wells

Contaminant	Current Standards (µg/L)	Date of Detection	Concentration Detected (µg/L)			
			MW-1	MW-2	SM-3	SM-8
Acenaphthene	530[a]	September 2013	155			
		June 2012	39.6			
		November 2011	12.2			
		July 2011	78	31		
		December 2010	63.3	66.6		
Bis(2-ethylhexyl)phthalate	6[b]	**September 2014**	**38.6**	**26.9**		
Di-n-butylphthalate	900[a]	September 2015		10.8		11
Fluorene	290[a]	September 2013	55.5			
		September 2012	15			
		June 2012	15			
		July 2011	27.4			
		December 2010	21	20.9		
Naphthalene	0.17 carcinogenic[a] 6.1 non-carcinogenic[a]	**September 2013**	**6,820**			
		December 2012	**29.5**	**27**		
		June 2012	**802**			

Contaminant	Current Standards (µg/L)	Date of Detection	Concentration Detected (µg/L)			
			MW-1	MW-2	SM-3	SM-8
		November 2011	**366**	**13.8**		
		July 2011	**2,670**	**1,100**		
		December 2010	**1,970**	**2,250**		
Phenanthrene	120[ac] (used pyrene as surrogate)	September 2013	18.7			

Notes:

a. EPA's risk-based screening levels for tapwater, available at: https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2015 (accessed 3/4/2016).

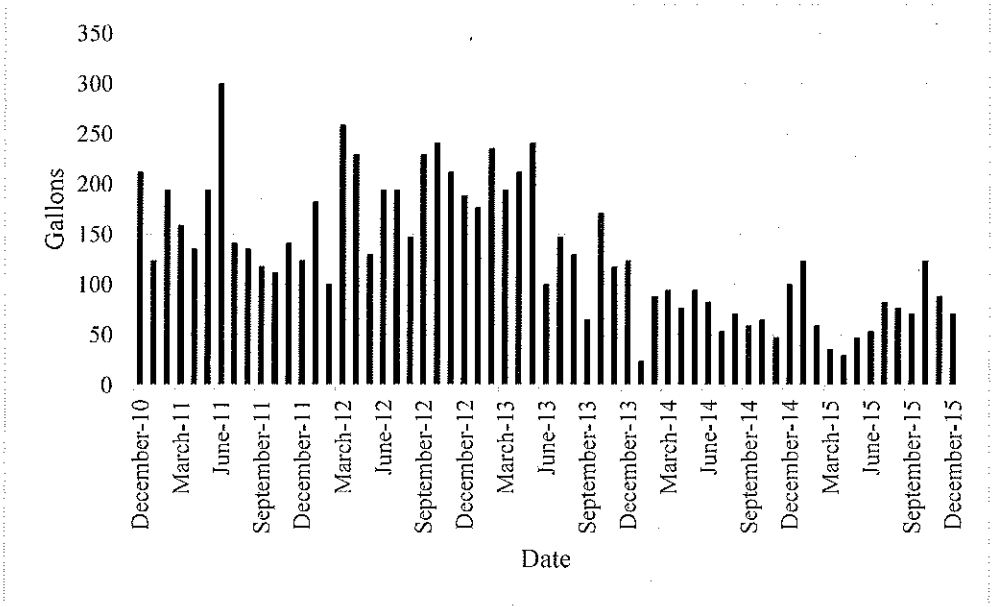
b. EPA's maximum contaminant levels (MCLs), available at: http://www.epa.gov/your-drinking-water/table-regulated-drinking-water-contaminants (accessed 3/4/2016).

µg/L = micrograms per liter

BOLD = exceeds current standards

The December 2015 Monthly Operational Report (Appendix A – Reference List) reports that since June 1991, when remedial action started, 63,059,960 gallons of liquids have been treated and discharged. About 70 gallons of DNAPL were recovered during December 2015 alone. Average monthly gallons of DNAPL recovered was 156 gallons in 2011, 192 gallons in 2012, 159 gallons in 2013, and 71 gallons per month in 2014 and 2015. Figure 1 below shows DNAPL recovery since December 2010.

Figure 1: Recovered DNAPL per Month, December 2010-2015



Because significant quantities of DNAPL continue to be recovered and groundwater cleanup goals will not be met in the foreseeable future, EPA is coordinating with EPA's Office of Superfund Remediation and Technology Innovation to perform a remedy optimization to assess the effectiveness of the groundwater remedy and identify a potential exit strategy for the Site.

To prevent subsidence, 11 off-site and on-site monitoring wells are checked to verify that allowable drawdown and minimum groundwater elevations are generally maintained. The subsidence monitoring well SM-5 had been

accidently destroyed by the City of Slidell's Public Works Department in the fall of 2015. The December 2015 monthly report shows that no significant settlement has occurred since system operations began and the initial survey.

Site Inspection

The site inspection took place on January 26, 2016. In attendance were Casey Luckett Snyder of EPA, John Halk of LDEQ, Rick Tibbs of SEMS, Inc., and Eric Marsh and Brice Robertson of Skeo Solutions. The purpose of the inspection was to assess the protectiveness of the remedy. Participants first noted that the Site was fenced and in good condition. A no trespassing sign marked the entrance to the Site. Participants met at the treatment building, where Mr. Tibbs led the team and showed all aspects of the treatment system. The components of the treatment system appeared to be in good condition, although some of the labels on the components were either faded or missing. Next, participants inspected the pumping wells in Array 1a and found all wells to be locked and in good condition. Mr. Tibbs opened one of the wells and participants noted that the interior components of the pumping well were also in good condition.

Participants next observed the bayou and sheet metal piling located along the banks of bayou where sediment remediation had been completed. Areas of sheet piling on both sides of the Bayou are in need of repair due to extensive corrosion at the water line. LDEQ is working to have the sheet piling evaluated since it does present a risk for bodily injury in some areas that are accessible to the public. Participants then walked over the cap. The team noted that the cap was in good condition. The team next observed Array 2 east of the cap. In the northern portion of the Site, the team observed the location of the former subsidence monitoring well SM-5, which had been accidently destroyed by the City of Slidell's Public Works Department in the fall of 2015. Ms. Luckett Snyder and Mr. Halk are working with the City of Slidell to have a new well installed. Participants then returned to the area near the treatment building, where they observed a functioning monitoring well, which was capped and locked. Lastly, participants drove to nearby Heritage Park and observed the area proposed for upcoming marina construction. Site inspection checklist and photos are included in Appendix E and F.

Skeo Solutions performed research at the Site's information repository, the Slidell branch of the St. Tammany Parish Public Library, located at 555 Robert Boulevard, Slidell, Louisiana 70458. The repository contained documents as recent as 2001. It should be updated with current documents.

Skeo Solutions performed property records research at the St. Tammany Clerk of Court – Slidell Annex Office on the Fifth Floor of the Administrative Complex (Towers Building), located at 520 Old Spanish Trail, Slidell, Louisiana 70458. Skeo Solutions identified the 2008 conveyance notice filed for the Site. Conveyance notices are tied to property owners in Louisiana, not parcels.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

A review of the relevant site documents (Appendix A), Applicable or Relevant and Appropriate Requirements (ARARs) and the site inspection indicates that the remedy is functioning as specified in site decision documents. The source remedy required removal and incineration of contaminated soil and sediment and consolidation under an on-site RCRA Subtitle C cap. According to available documentation, soil and sediment cleanup goals have been met. The groundwater remedy included groundwater pumping and treatment. Minimal exceedances of effluent discharge limitations and some detections of PAHs have occurred during this review period. Groundwater cleanup goals have not been met based on the continued recovery of DNAPL; as a result, cleanup goals are unlikely to be met in a timely manner. The groundwater plume appears to be effectively contained, though a current groundwater plume map is not available. EPA is planning an optimization effort to assess the effectiveness of the groundwater remedy and identify a potential exit strategy for the Site.

O&M activities support the current groundwater remedy. Routine inspections of the landfill cap are necessary and are documented in the monthly reports to ensure the landfill remains intact and functional. The subsidence monitoring well SM-5 had been accidently destroyed by the City of Slidell's Public Works Department in the fall of 2015. SM-5 is a subsidence monitoring well and is used to evaluate the long-term effectiveness of the landfill remedy. It is not located within the groundwater plume boundary and is not considered a potential conduit for contaminated groundwater. LDEQ issued the City a letter in February 2016 requiring them to address damaged well SM-5. The City implemented temporary corrective measures as instructed by LDEQ. The City is required to comply with the P&A requirements of the states' Water Well Regulations. The City has currently issued a request for bids to plug SM-5 and for the construction of a new well.

Current institutional controls are not required in site decision documents, although they are necessary because contamination remains on site above levels that would support UU/UE. Current controls include a Conveyance Notification restricting the disturbance of, destruction of, interference with, or in any way damaging or altering elements of the CERCLA remedy, or disturbing or removing soil or groundwater without authorization. The notification is directly linked to the property parcel owner. A fence surrounds the Site and appears to effectively prevent trespassing.

Groundwater contamination remains under residential properties on the west side of the bayou. Residents are connected to a municipal supply of drinking water. An institutional control is necessary to restrict the use of groundwater in areas of remaining groundwater contamination until cleanup goals are achieved.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Exposure assumptions used at the time of the remedy are still valid. The vapor intrusion pathway has not been evaluated and plume maps have not been updated. Toxicity data and cleanup values have changed since the signing of the ROD. Appendix H evaluates the protectiveness of cleanup goals identified in the 1987 ROD. Cleanup goals in the 1987 ROD remain protective of human health and the environment. If reuse options are considered for the Site, soil confirmation sampling may be appropriate based on the type of reuse evaluated.

The remedy is progressing as expected toward meeting most RAOs. EPA, through the services of EPA's Office of Superfund Remediation and Technology Innovation, is planning an optimization of the groundwater remedy to access the effectiveness of the groundwater remedy and identify a potential exit strategy for the Site.

There have been no changes in potential exposure pathways. The remedy was put in place before the vapor intrusion pathway was fully understood, therefore, the vapor intrusion pathway has not been evaluated. Residential homes are located southwest of Array 3. Groundwater flows from the residential area toward the Bayou and the groundwater plume. The groundwater pump and treat system pulls constant negative head on the plume from the treatment system. No odor complaints have been received from any residences. Creosote has a very low odor threshold, so it is unlikely vapor intrusion is occurring. Groundwater samples from MW-1, MW-2, SM-3 and SM-8 did not exceed current standards in 2015 (see Table 4). Regardless, the vapor intrusion pathway may need to be evaluated, per the EPA's 2015 vapor intrusion guidance.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues and Recommendations Identified in the FYR:

OU(s): 1 & 2	Issue Category: Institutional Controls			
	Issue: Institutional controls are in place for the landfill and are necessary to ensure the protectiveness of the remedy. There are no current groundwater restrictions on private property above the southwestern groundwater plume. No institutional controls are included in site decision documents.			
	Recommendation: Initiate discussions with the City of Slidell regarding the need for a City ordinance to restrict construction of private water wells above the southwestern groundwater plume. Evaluate the need to include institutional controls for the landfill and the groundwater in an appropriate decision document.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State	EPA	12/31/2020

OU(s): 2	Issue Category: Remedy Performance			
	Issue: Subsidence monitoring well SM-5 located within the City of Slidell Public Works maintenance yard was inadvertently destroyed in 2015.			
	Recommendation: Replace subsidence monitoring well SM-5. Ensure wells are labeled acknowledging use as part of the Superfund site.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	Other	State	12/31/2016

OU(s): 2	Issue Category: Remedy Performance			
	Issue: The extent of the contaminated groundwater plume needs to be updated.			
	Recommendation: Determine data needs and necessary monitoring and update site plume maps.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	12/31/2018

OU(s): 2	Issue Category: Monitoring			
	Issue: Based on current knowledge of groundwater contamination, it is unclear if the vapor intrusion pathway needs to be further evaluated.			
	Recommendation: Using data collected and the updated plume maps, further evaluate the need for a vapor intrusion evaluation per EPA's 2015 vapor intrusion guidance.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	7/31/2018

OU(s): 2	Issue Category: Remedy Performance			
	Issue: Groundwater cleanup goals have not been met and are unlikely to be met in an acceptable timeframe.			
	Recommendation: Perform an optimization of the Site. The optimization should assess the effectiveness of the groundwater remedy and identify a potential exit strategy for the Site.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	9/30/2018

VII. PROTECTIVENESS STATEMENTS

Protectiveness Statement	
Operable Unit: 1	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The OU1 remedy currently protects human health and the environment because there are no completed exposure pathways. However, in order for the remedy to be protective in the long term, EPA should evaluate the need to include institutional controls already in place on the landfill in a site decision document to ensure protectiveness.	

APPENDIX A – REFERENCE LIST

Bayou Bonfouca Superfund Site. December 2015 Monthly Operational Report. Southern Environmental Management & Specialties. January 21, 2016.

Bayou Bonfouca Superfund Site. September 2013 Monthly Operational Report. Southern Environmental Management & Specialties. October 31, 2013.

Bayou Bonfouca Site. Remedial Investigation Report. April 25, 1986.

Explanation of Significant Differences Bayou Bonfouca OU1. United States Environmental Protection Agency Region 6. February 5, 1990.

Fourth Five-Year Review Report for Bayou Bonfouca Superfund site. Slidell, St. Tammany Parish, Louisiana. U.S. Environmental Protection Agency Region 6. July 2011.

Memorandum to EPA R6. Bayou Bonfouca – Hurricane Impacts Evaluation. CH2MHILL. January 25, 2006.

Operation and Maintenance Plan. Groundwater Extraction Wells and Groundwater Treatment System Modifications (Phase 2. Bayou Bonfouca Superfund Site. Slidell, Louisiana. Prepared for Louisiana Department of Environmental Quality. Revised September 2012.

Pre-Final Inspection Report – Bayou Bonfouca Superfund NPL Site. United States Environmental Protection Agency Region 6. September 30, 1997.

Public Health Assessment Addendum. Bayou Bonfouca. Slidell, St. Tammany Parish, Louisiana. Louisiana Office of Public Health under cooperative agreement with the Agency for Toxic Substances and Disease Registry.

Record of Decision Amendment. Bayou Bonfouca OU1. United States Environmental Protection Agency Region 6. July 20, 1995.

Record of Decision Bayou Bonfouca OU1. United States Environmental Protection Agency Region 6. August 15, 1985.

Record of Decision Bayou Bonfouca OU1. United States Environmental Protection Agency Region 6. March 31, 1987.

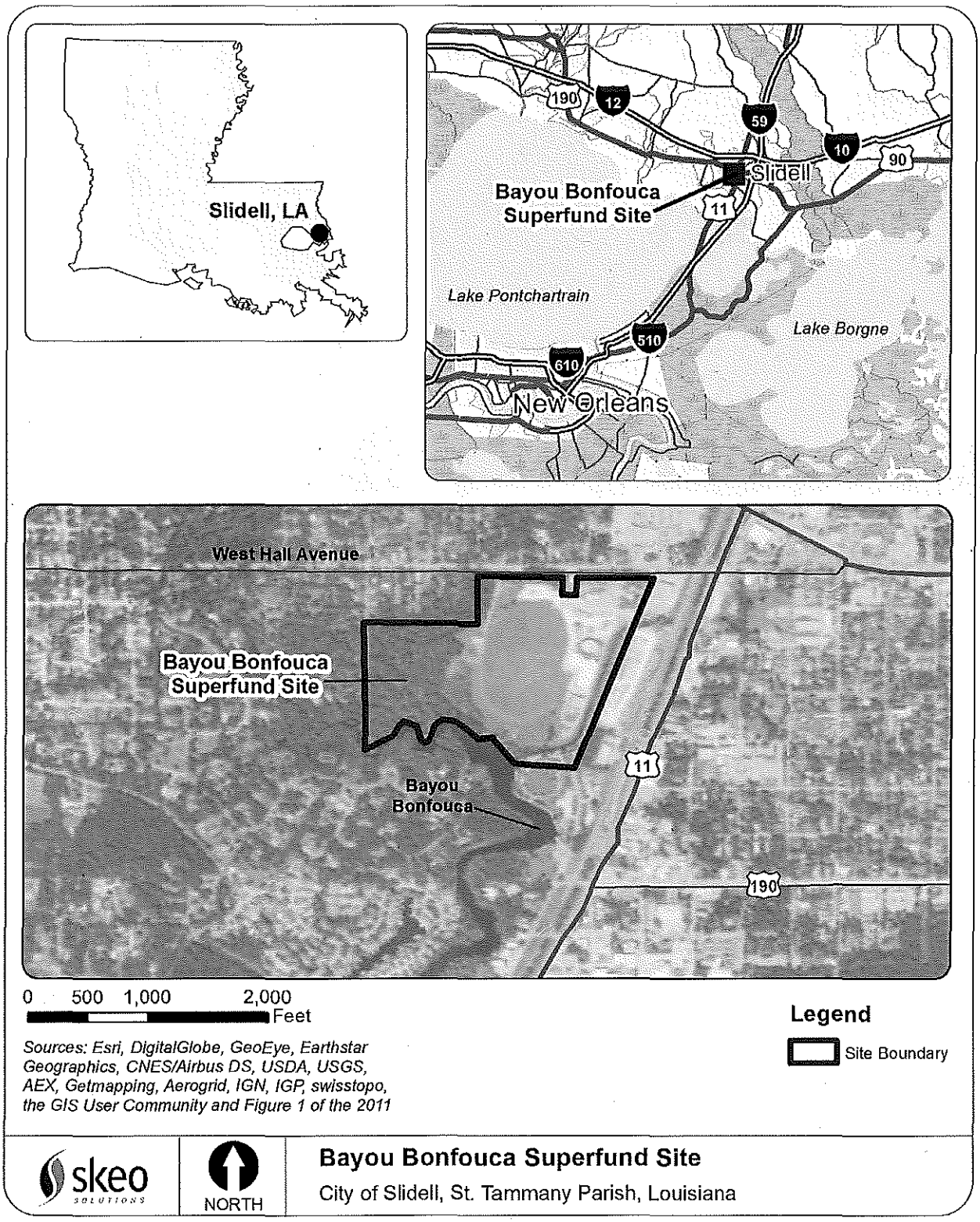
Sediment Remedy Re-evaluation. Bayou Bonfouca Site. Slidell, St. Tammany Parish, Louisiana. Prepared by U. S. EPA Environmental Response Team. February 2003.

APPENDIX B – SITE CHRONOLOGY

Event	Date
A creosote plant operated on site under several different ownerships	1882-1970
U.S. Coast Guard undertook investigation of the Bayou Bonfouca waterway	1976
EPA, U.S. Coast Guard and National Oceanic and Atmospheric Administration conducted supplemental study of Bayou Bonfouca	1978
State of Louisiana rejected Braselman Corporation's proposed cleanup plan for on-site contamination	1981
EPA proposed Site for listing on Superfund program's National Priorities List (NPL)	December 30, 1982
EPA finalized Site on NPL	September 8, 1983
EPA initiated remedial investigation and feasibility study (RI/FS)	Late 1983
EPA completed first phase of RI/FS	Summer 1984
EPA completed Focused FS	May 1985
EPA issued Administrative Order directing site owner to fence Site	July-August 1985
EPA signed source control operable unit (OU1) Record of Decision (ROD)	August 15, 1985
EPA completed Supplemental Phase II RI/FS	June 1986
EPA signed Site's final ROD	March 31, 1987
EPA conducted design investigations and discovered horizontal and vertical extent of contaminants within bayou sediments greater than expected based on earlier information	Summer 1988
EPA signed Site's Explanation of Significant Differences (ESD)	February 15, 1990
EPA began operation of long-term remedial action for groundwater	July 10, 1991
EPA initiated excavation and incineration activities for source control OU	November 1993
EPA issued ROD Amendment calling for use of incinerator in treating wastes from nearby Southern Shipbuilding Corporation Superfund site	July 20, 1995
EPA completed OU1 remedial activities	July 28, 1995
EPA completed Site's first five-year review (FYR)	September 1996
EPA removed incinerator after operations at Southern Shipbuilding Corporation site ceased	December 1996
Braselman Corporation deeded site property to City of Slidell	January 1997
EPA issued Preliminary Closeout Report for source control OU	September 30, 1997
EPA completed Performance Evaluation Report for Site's groundwater system and determined system modifications were necessary	September 1997
EPA completed phase I design investigation for source control OU	October 1998
EPA completed Site's second FYR	June 2001
EPA transferred responsibility for site O&M activities to LDEQ; LDEQ completed final O&M Plan for groundwater extraction wells and modifications to groundwater treatment systems	July 2001
LDEQ completed revised final O&M Plan Addendum	December 20, 2002
EPA completed Site's sediment remedy re-evaluation	February 2003
Hurricane Katrina made landfall near Site, resulting in damage to treatment system and groundwater treatment plant	August 29, 2005
EPA completed Site's third FYR	May 2006
LDEQ evaluated impact of Hurricane Katrina and Hurricane Rita storm surges on remedy's protectiveness	December 2006
EPA completed Site's fourth FYR	July 2011
LDEQ revised Site's O&M Plan	September 2012

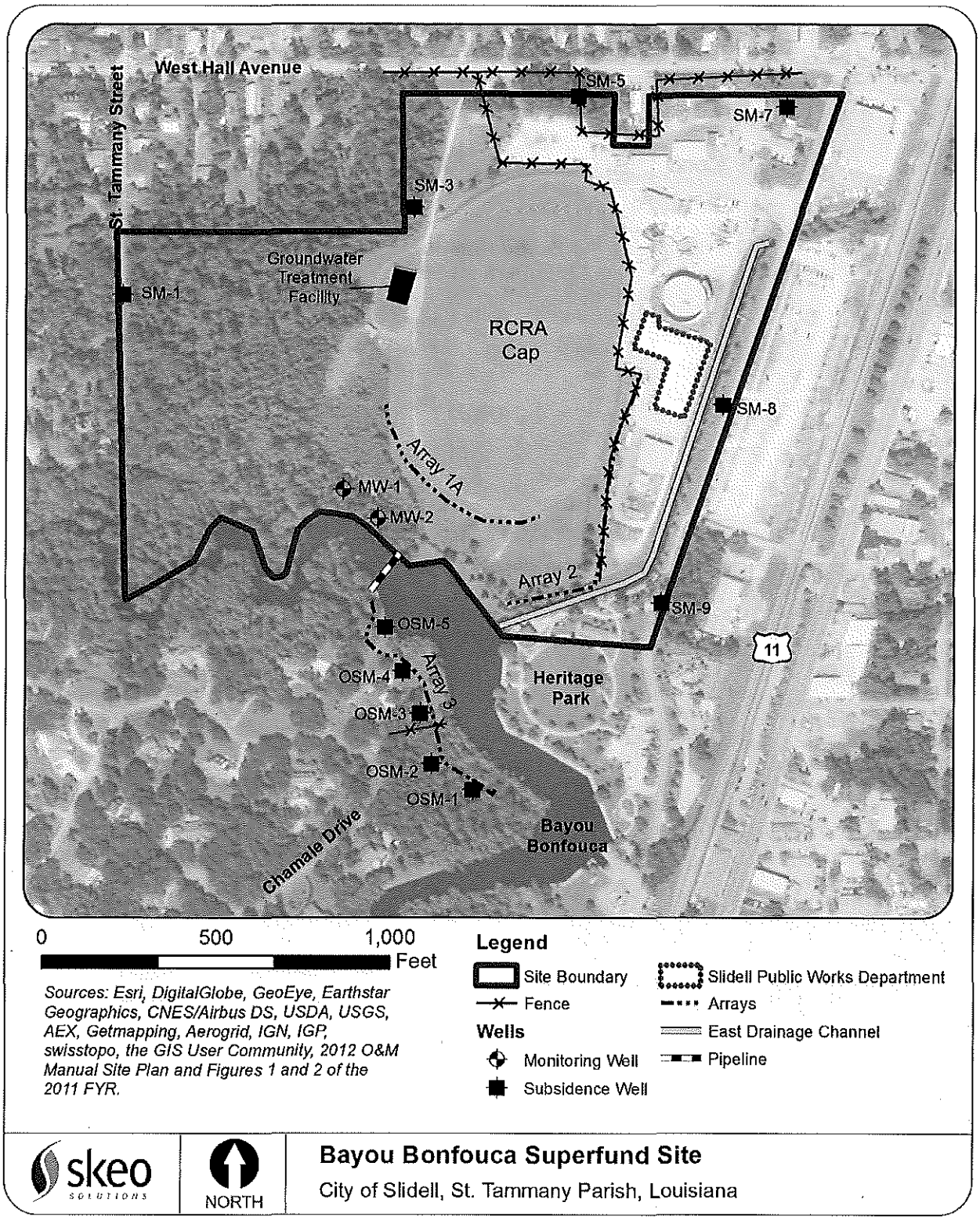
APPENDIX C – SITE MAPS

Figure C-1: Site Vicinity Map



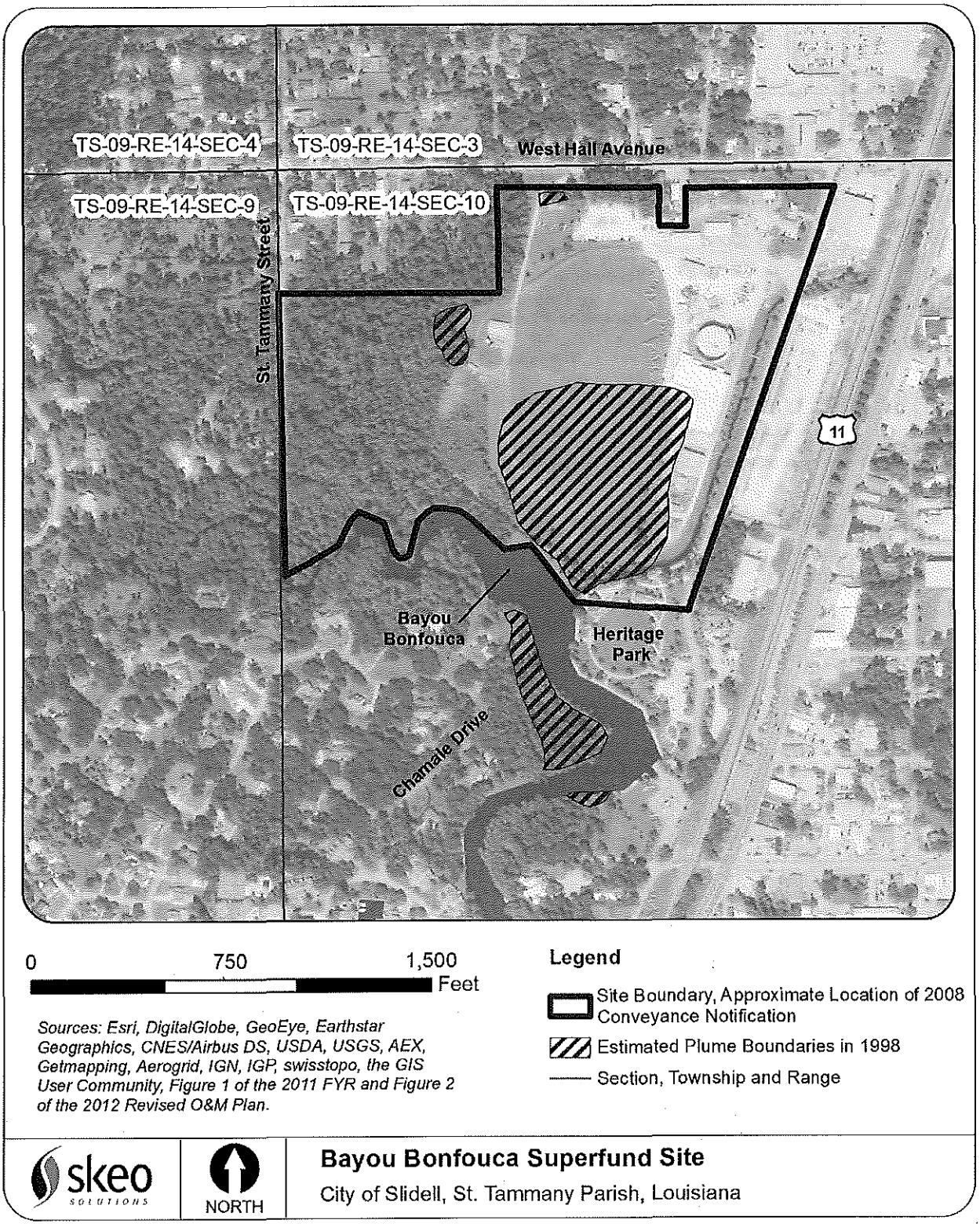
Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Figure C-2: Site Detail Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Figure C-3: Institutional Control Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site

APPENDIX D – PRESS NOTICE

Bayou Bonfouca Superfund Site
Public Notice
U. S. Environmental Protection Agency, Region 6

November 2015

The U.S. Environmental Protection Agency Region 6 (EPA) will be conducting the fifth five-year review of remedy implementation and performance at the Bayou Bonfouca Superfund site (Site) in Slidell, Louisiana. The remedy consisted of dredging contaminated sediments from Bayou Bonfouca, on-site incineration of contaminated soils and sediments, and extraction and treatment of contaminated groundwater. Remedy construction finished in 1997. The five-year review will determine if the remedies are still protective of human health and the environment. The five-year review is scheduled for completion in July 2016.

The report will be made available to the public at the following local information repository:

Slidell Public Library
St. Tammany Parish Library Slidell Branch
555 Robert Blvd
Slidell, Louisiana, 70458
(985) 646-6470

Site status updates are available on the Internet at
http://www.epa.gov/superfund/bayou-bonfouca

All media inquiries should be directed
to the EPA Press Office at (214) 665-2200

For more information about the Site, contact:
Casey Luckett Snyder/Remedial Project Manager
(214) 665-7393
or 1-800-533-3508 (toll-free)
or by email at luckett.casey@epa.gov

APPENDIX E – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Bayou Bonfouca Superfund Site	**Date of Inspection:** 01/26/2016
Location and Region: Slidell, LA / Region 6	**EPA ID:** LAD980745632
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** Cloudy skies, 55 degrees Fahrenheit

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other: _____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** Rick Tibbs (Name) | Site Manager, SEMS Inc. (Title) | 02/03/2016 (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: 985-646-0604
   Problems, suggestions ☐ Report attached: _____

2. **O&M Staff** _____ (Name) | _____ (Title) | _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems/suggestions ☐ Report attached: _____

3. **Local Regulatory Authorities and Response Agencies** (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.

   Agency City of Slidell
   Contact Blaine Clancy (Name) | City Engineer (Title) | 02/10/2016 (Date) | _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency LDEQ
   Contact John Halk (Name) | Project Manager (Title) | 02/03/2016 (Date) | _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____ (Name) | _____ (Title) | _____ (Date) | _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____ (Name) | _____ (Title) | _____ (Date) | _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

	Agency _____ Contact _____ _____ _____ _____ Name Title Date Phone No. Problems/suggestions ☐ Report attached: _____
4.	**Other Interviews** (optional) ☐ Report attached: _____
Casey Luckett Snyder, EPA Remedial Project Manager	
Nearby Resident	

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1.	**O&M Documents**				
	☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A	
	☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A	
	☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: _____				
2.	**Site-Specific Health and Safety Plan**	☒ Readily available	☒ Up to date	☐ N/A	
	☒ Contingency plan/emergency response plan	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: _____				
3.	**O&M and OSHA Training Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
4.	**Permits and Service Agreements**				
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A	
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A	
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A	
	☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
7.	**Groundwater Monitoring Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A	
	Remarks: _____				
9.	**Discharge Compliance Records**				
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A	
	☐ Water (effluent)	☒ Readily available	☒ Up to date	☐ N/A	
	Remarks: _____				

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☒ Contractor for state

☐ PRP in-house ☐ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☒ Readily available ☒ Up to date

☒ Funding mechanism/agreement in place ☐ Unavailable

Current O&M cost estimate: $385,000/year ☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: _____

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: One sign posted at entry to Site.

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by): _____

Frequency: _____

Responsible party/agency: _____

Contact _____ _____ _____ _____

Name Title Date Phone no.

Reporting is up to date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

2.	**Adequacy** ☐ ICs are adequate	☐ ICs are inadequate	☐ N/A
	Remarks: Conveyance Notice issued on April 22, 2008.		
D. General			
1.	**Vandalism/Trespassing** ☐ Location shown on site map	☒ No vandalism evident	
	Remarks: _____		
2.	**Land Use Changes On Site** ☐ N/A		
	Remarks: The City recently added awnings for heavy equipment on site in the equipment yard.		
3.	**Land Use Changes Off Site** ☐ N/A		
	Remarks: Preliminary planning underway to develop a marina that will include docks, boat slips and new walkways in the Bayou adjacent to the Site.		
VI. GENERAL SITE CONDITIONS			
A. Roads ☒ Applicable ☐ N/A			
1.	**Roads Damaged** ☐ Location shown on site map	☒ Roads adequate	☐ N/A
	Remarks: _____		
B. Other Site Conditions			
	Remarks: Areas of sheet piling are in need of repair.		
VII. LANDFILL COVERS ☒ Applicable ☐ N/A			
A. Landfill Surface			
1.	**Settlement** (low spots) ☐ Location shown on site map	☒ Settlement not evident	
	Arial extent: _____	Depth: _____	
	Remarks: _____		
2.	**Cracks** ☐ Location shown on site map	☒ Cracking not evident	
	Lengths: _____	Widths: _____	Depths: _____
	Remarks: _____		
3.	**Erosion** ☐ Location shown on site map	☒ Erosion not evident	
	Arial extent: _____	Depth: _____	
	Remarks: _____		
4.	**Holes** ☐ Location shown on site map	☒ Holes not evident	
	Arial extent: _____	Depth: _____	
	Remarks: _____		
5.	**Vegetative Cover** ☒ Grass	☒ Cover properly established	
	☒ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)	☒ N/A	
	Remarks: _____		
7.	**Bulges** ☐ Location shown on site map	☒ Bulges not evident	

Arial extent: _____ Height: _____

Remarks: _____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident

☐ Wet areas	☐ Location shown on site map	Arial extent: _____
☐ Ponding	☐ Location shown on site map	Arial extent: _____
☐ Seeps	☐ Location shown on site map	Arial extent: _____
☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____

Remarks: _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map

☒ No evidence of slope instability

Arial extent: _____

Remarks: _____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☒ N/A or okay

Remarks: _____

2. **Bench Breached** ☐ Location shown on site map ☒ N/A or okay

Remarks: _____

3. **Bench Overtopped** ☐ Location shown on site map ☒ N/A or okay

Remarks: _____

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

D. Cover Penetrations ☒ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☒ Passive

☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☒ Good condition
☐ Evidence of leakage at penetration		☐ Needs maintenance	☐ N/A

Remarks: _____

2. **Gas Monitoring Probes**

☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition
☐ Evidence of leakage at penetration		☐ Needs maintenance	☒ N/A

Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled	☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A Remarks: _____	
4. **Extraction Wells Leachate** ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A Remarks: _____	
5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A Remarks: Operators regularly monitor for subsidence at the Site.	
E. Gas Collection and Treatment ☐ Applicable ☒ N/A	
F. Cover Drainage Layer ☒ Applicable ☐ N/A	
1. **Outlet Pipes Inspected** ☐ Functioning ☒ N/A Remarks: _____	
2. **Outlet Rock Inspected** ☐ Functioning ☒ N/A Remarks: _____	
G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A	
H. Retaining Walls ☐ Applicable ☒ N/A	
I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A	
1. **Siltation** ☐ Location shown on site map ☒ Siltation not evident Area extent: _____ Depth: _____ Remarks: _____	
2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A ☒ Vegetation does not impede flow Area extent: _____ Type: _____ Remarks: _____	
3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident Area extent: _____ Depth: _____ Remarks: _____	
4. **Discharge Structure** ☒ Functioning ☐ N/A Remarks: _____	
VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A	
IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A	
A. Groundwater Extraction Wells, Pumps and Pipelines ☒ Applicable ☐ N/A	
1. **Pumps, Wellhead Plumbing and Electrical** ☒ Good condition ☒ All required wells properly operating ☐ Needs maintenance ☐ N/A Remarks: _____	
2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**	

☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☒ N/A

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (check components that apply)

☐ Metals removal ☒ Oil/water separation ☐ Bioremediation

☐ Air stripping ☒ Carbon adsorbers

☒ Filters: _____

☐ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☒ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☒ Quantity of groundwater treated annually: Refer to reports.

☐ Quantity of surface water treated annually: _____

Remarks: Some equipment labels not legible.

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair

☒ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: SM-5 well was damaged and needs to be repaired.

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☒ N/A

Remarks: _____

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The remedy is designed to recover free-phase creosote from the shallow artesian aquifer and to prevent migration of dissolved-phase and free-phase contamination into Bayou Bonfouca. The groundwater treatment system is effective at removing creosote.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M activities appear to be well-implemented at the Site and appear to be adequate to keep the remedy protective. SM5 needs to be reinstalled at some point in the near future.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

There were no issues or problems that would impact the current protectiveness of the remedy.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

EPA and LDEQ are conducting a groundwater study to assess the effectiveness of the groundwater remedy and identify a potential exit strategy for the Site.

APPENDIX F – REMEDIAL ACTION AND SITE INSPECTION PHOTOS

BEFORE –Remedial Action Photos: 1993-1994

Bayou remedial activities

Incinerator operations

AFTER – Site Inspection Photos: January, 2016

Entrance to Site with locked gate and signage

Holding tanks, part of the groundwater treatment system

Recovered-creosote tank, part of the groundwater treatment system

Groundwater treatment system and building

Capped landfill from the southern part of the Site

Array 1a extraction wells

Interior of one of the Array 1a extraction wells

Metal sheet piling surrounding Bayou Bonfouca

Array 2 extraction wells

Location of the former and currently damaged monitoring well SM-5

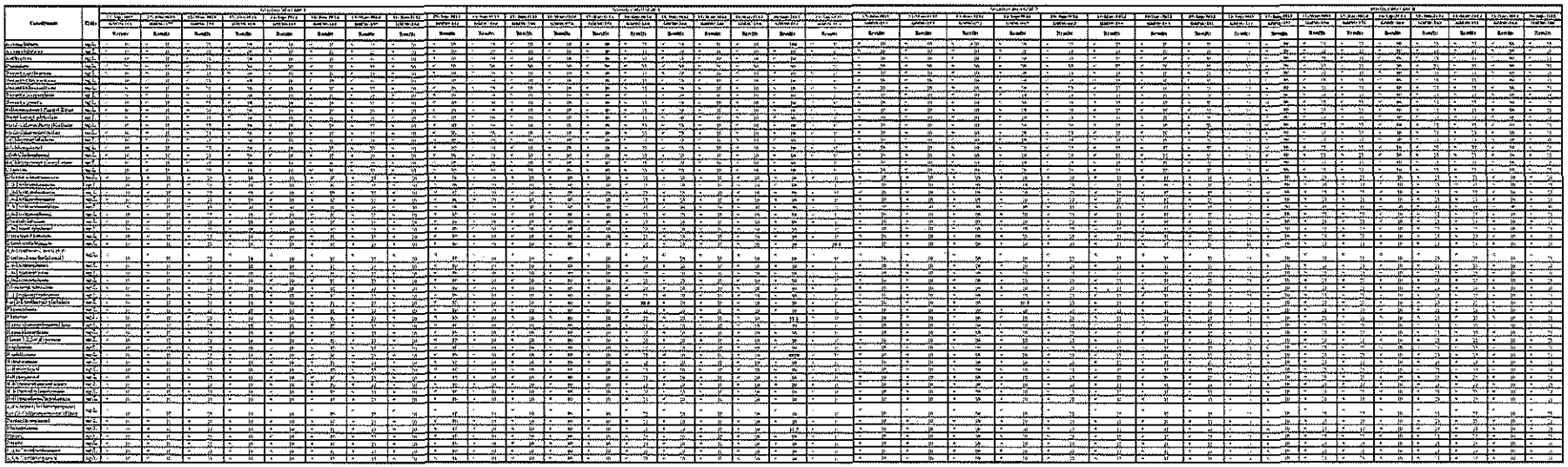
APPENDIX G – DATA TABLES

Table G-1: Quarterly Effluent Discharge Summary (Table 7 in the December 2015 Monthly Report)

Constituents	Effluent Limitations		23-Sep-2015 EDW-734		17-Jun-2015 EDW-731		31-Mar-2015 EDW-728		17-Dec-2014 EDW-725		24-Sep-2014 EDW-724		10-Jun-2014 EDW-721		19-Mar-2014 EDW-719		18-Dec-2013 EDW-715		25-Sep-2013 EDW-712		12-Jun-2013 EDW-709		29-May-2013 EDW-707	
			Results	Exceed? (Y or N)	Results	Exceed? (Y or N)	Results	Exceed? (Y or N)	Results	Exceed? (Y or N)	Results	Exceed? (Y or N)	Results	Exceed? (Y or N)	Results	Exceed? (Y or N)	Results	Exceed? (Y or N)	Results	Exceed? (Y or N)	Results	Exceed? (Y or N)	Results	Exceed? (Y or N)
Total Arsenic	0.5	mg/L	0.117	N	< 0.01	N	< 0.0193	N	< 0.0309	N	0.0919	N	0.0614	N	0.0965	N	< 0.01	N	0.0180	N	< 0.0100	N	0.0995	N
Total Chromium	0.5	mg/L	< 0.01	N	< 0.01	N	< 0.01	N	< 0.02	N	< 0.02	N	< 0.01	N	< 0.01	N	< 0.01	N	< 0.01	N	< 0.01	N	< 0.01	N
Total Zinc	0.5	mg/L	< 0.02	N	< 0.02	N	< 0.02	N	< 0.02	N	< 0.02	N	< 0.02	N	< 0.02	N	< 0.02	N	< 0.02	N	< 0.02	N	< 0.02	N
Acrolein	100	ug/L	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N
Acrylonitrile	232	ug/L	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N
Benzene	134	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	14.2	N	21.7	N	< 5	N	< 5	N	< 5	N	< 5	N	98.4	N
Dichlorobromomethane	100	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Bromoform	100	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Methyl Bromide (Bromomethane)	100	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Carbon Tetrachloride	380	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Chlorobenzene	380	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Chloroethane	295	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
2-Chloroethyl Vinyl Ether	100	ug/L	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N
Chloroform	325	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	606	N	< 5	N	< 5	N	< 5	N
Methyl Chloride (Chloromethane)	295	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Chlorodibromomethane	100	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
1,1-Dichloroethane	59	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
1,2-Dichloroethane	574	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
1,1-Dichloroethylene (1,1-Dichloroethene)	60	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
1,2-Trans-Dichloroethene	172	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
1,2-Dichloropropane	794	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Total 1,3-Dichloropropene (cis and trans-1,3-Dichloropropylene)	794	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Ethylbenzene	380	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	40.6	N	55	N	< 5	N	< 5	N	< 5	N	< 5	N	273	N
Methylene Chloride	170	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
1,1,2,2-Tetrachloroethane	100	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Tetrachloroethene	164	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Toluene	74	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	23	N
1,1,1-Trichloroethane	59	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
1,1,2-Trichloroethane	127	ug/L	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N	< 5	N
Vinyl Chloride	69	ug/L	< 2	N	< 2	N	< 2	N	< 2	N	< 2	N	< 2	N	< 2	N	< 5	N	< 5	N	< 5	N	< 5	N
Acenaphthene	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Acenaphthylene	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Anthracene	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Benzidine	100	ug/L	< 30	N	< 30	N	< 30	N	< 30	N	< 30	N	< 30	N	< 30	N	< 30	N	< 30	N	< 30	N	< 30	N
Benzo(a)anthracene	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Benzo(b)fluoranthene	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Benzo(k)fluoranthene	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Benzo(g,h,i)perylene	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Benzo(a)pyrene	48	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
4-Bromophenyl Phenyl Ether	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Butylbenzylphthalate	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
bis(2-Chloroethoxy)Methane	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
bis(2-Chloroethyl)ether	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
2-Chloronaphthalene	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
2-Chlorophenol	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
3&4-Chlorophenol	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
4-Chlorophenylphenylether	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Chrysene	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Dibenzo(a,h)anthracene	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
1,2-Dichlorobenzene	794	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
1,3-Dichlorobenzene	380	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
1,4-Dichlorobenzene	380	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
3,3-Dichlorobenzidine	100	ug/L	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N	< 20	N
2,4-Dichlorophenol	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Diethylphthalate	113	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
2,4-Dimethylphenol	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	**140**	Y	**165**	Y	< 10	N	< 10	N	< 10	N	< 10	N	**587**	Y
Dimethyl Phthalate	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Di-n-butylphthalate	43	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
4,6-Dinitro-o-Cresol (4,6-Dinitro-2-methylphenol)	277	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
2,4-Dinitrophenol	4201	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
2,4-Dinitrotoluene	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
2,6-Dinitrotoluene	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Di-n-octyl phthalate	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
1,2-Diphenylhydrazine	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
bis(2-Ethylhexyl)phthalate	258	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Fluoranthene	54	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Fluorene	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Hexachlorocyclopentadiene	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Hexachloroethane	794	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Indeno(1,2,3-c,d)pyrene	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Isophorone	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Naphthalene	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Nitrobenzene	6402	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
2-Nitrophenol	231	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
4-Nitrophenol	367	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
N-Nitrosodimethylamine	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
N-Nitrosodiphenylamine	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
N-Nitrosodi-n-Propylamine	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
2,2'-Oxybis(1-chloropropane) bis (2-Chloroisopropyl)Ether	794	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Pentachlorophenol	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Phenanthrene	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Phenol	47	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
Pyrene	48	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
1,2,4-Trichlorobenzene	794	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N
2,4,6-Trichlorophenol	100	ug/L	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N	< 10	N

Notes:
1) EDW-707 = The 707th sample taken since system startup.
2) System carbon changeout was performed on June 3, 2010.
3) Exceedances shown in "Bold Text."

Table G-2: Quarterly Analytical Monitoring Well Sample Summary (Table 8 in the December 2015 Monthly Report)



APPENDIX H - ARARs AND TOXICITY REVIEW

This section provides an ARARs and toxicity review of groundwater, soil and sediment cleanup goals.

OU2 – Groundwater

The Site's 1987 ROD established remedial goals for total PAHs based on the Clean Water Act. Table 5 compares cleanup goals to 2016 MCLs for benzo(a)pyrene, a proxy for total PAHs. MCLs are less stringent for PAHs than those described in the 1987 ROD.

Table H-1: Review of Groundwater Cleanup Goals

COC	1987 ROD Remedial Goal (µg/L)[a]	2016 EPA MCL (µg/L)[b]	ARAR
Total PAHs	0.0031	0.2[c]	Less stringent

Notes:

a. The 1987 ROD indicated the current criteria for groundwater by the Clean Water Act. The technical feasibility of cleaning the groundwater to this level is unknown.
b. Federal Safe Drinking Water Act MCLs are available at: http://www.epa.gov/safewater/contaminants/index.html (accessed 2/16/2016).
c. Benzo(a)pyrene is one of the more commonly monitored PAHs, and is used as a proxy for PAHs.

µg/L = micrograms per liter

Soil

The Site's 1987 ROD established remedial goals for soil based on human health using a Public Health Addendum. The Louisiana Office of Public Health – under cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) – use a Centers for Disease Control (CDC)-derived action level of 2,3,7,8-tetrachloro-dibenzo-p-dioxin (2,3,7,8-TCDD) for contaminated residential soil for 10^{-6} excess lifetime risk of 1 part per billion (ppb) in their Public Health Assessment Addendum. Because dioxin was five orders of magnitude more toxic than PAHs, the CDC-derived a residential soil action level of 100 mg/kg of benzo(a)pyrene, equivalent to 1 ppb of 2,3,7,8-TCDD in soil for the Site.

Table H-2 compares the cleanup goal to EPA's industrial regional screening level (RSL) which is equivalent to a 3.4×10^{-4} risk level. This level is slightly above EPA's risk management range of 1×10^{-4} to 1×10^{-6}. If reuse opportunities are considered for the Site, soil confirmation sampling may be appropriate to ensure remaining contamination does not pose an unacceptable risk.

Table H-2: Review of Soil Cleanup Goals

COC	1987 ROD Remedial Goal (mg/kg)	EPA Industrial RSL[a] (mg/kg)		Industrial Risk Level	
		1×10^{-6} Risk	HQ = 1	Cancer Risk[b,c]	Noncancer HQ[c]
Soil					
Total PAHs[d]	100	0.29	NA	3.4×10^{-4}	NA

Notes:

a. Current RSLs, dated November 2015, are available at http://www.epa.gov/risk/risk-based-screening-table-generic-tables (accessed 3/21/2016).
b. Cancer risks were calculated using the following equation, based on the fact that RSLs are derived based on 1×10^{-6} risk:
   Cancer risk = (cleanup goal ÷ cancer RSL) × 10^{-6}
c. The 1990 ESD re-evaluated cleanup action levels in the ROD showing that the 1987 ROD action level of 100 ppm total PAHs for surface soils is equivalent to approximately 9 ppm

COC	1987 ROD Remedial Goal (mg/kg)	EPA Industrial RSL[a] (mg/kg)		Industrial Risk Level	
		1×10^{-6} Risk	HQ = 1	Cancer Risk[b,c]	Noncancer HQ[c]
carcinogenic PAHs and identified a less than 3×10^{-5} lifetime increased risk to a person residing on site.					
d. Benzo(a)pyrene is used a proxy for PAHs.					
HQ = hazard quotient					
NA = a noncancer hazard index has not been identified for this contaminant.					
mg/kg = milligrams per kilogram					

Sediment

The 1987 ROD identified a sediment cleanup goal of 1,300 mg/kg. This cleanup goal was calculated based on site-specific tests to mitigate further groundwater contamination and significantly reduce hazard to aquatic biota.

In 2003, EPA's Environmental Response Team conducted an evaluation of whether site cleanup goals were being met for sediment and whether dredging was an effective remedial approach. The investigation focused on the collection and chemical analyses of site sediments and surface water, a benthic macroinvertebrate survey, and sediment toxicological evaluations. In the most heavily contaminated sediment location, the most contaminated sample contained less than 100 mg/kg total PAHs, indicating the contaminant-level remediation objective has been met. A benthic macroinvertebrate community survey was conducted at eight sampling locations. A total of 131 organisms representing 17 taxa were collected. All of the species were characteristic of low-salinity tidal freshwater habitats. The report summarized that the benthic community has improved as a result of the remediation and the presence of pollution-sensitive species in the remediated area indicates the quality of the benthic community should continue to improve in the future.